



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/791,277

03/03/2004

Soichi Oikawa

008312-0308599

8934

909 7590 01/05/2007
PILLSBURY WINTHROP SHAW PITTMAN, LLP
P.O. BOX 10500
MCLEAN, VA 22102

EXAMINER

HARRIS, GARY D

ART UNIT

PAPER NUMBER

1773

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

01/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/791,277

Applicant(s)

OIKAWA ET AL.

Examiner

Gary D. Harris

Art Unit

1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1, 2, 7-13, 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimazaki et al. (U.S. PGPub 2004/0184176).

As to Claim 1 and 11, Shimazaki et al. ('176) teaches a Perpendicular media with non-magnetic substrate (Paragraph 4) with multi layered under layer (Paragraph 20) with a ferromagnetic under layer and perpendicular anisotropy that includes a weak saturation magnetization and perpendicular recording layer (Paragraph 10). A reproduction apparatus with similar structure is also discussed (Paragraph 187). Shimazaki et al. ('176) does not teach the ferromagnetic underlayer having a perpendicular anisotropy of 0.5kOe and saturation magnetization range of 50 to 150emu/cc. However, these properties are inherent in Shimazaki et al. ('176) because the applicants and the inventors teach virtually identical structures with similar materials. The physical properties of similar materials will inherently be similar. The burden of proof is shifted to the applicant to show the prior art properties are different from those claimed. See *In re Fitzgerald*, 619 F. 2d 67, 205 USPQ 594 (CCPA 1980).

As to Claim 2 and 13, Shimazaki et al. ('176) describes a soft magnetic underlayer as, a layer formed to optimally control the crystalline orientation of the recording layer formed to have a thickness of 5 nm as the seed layer on the soft magnetic under layer (Paragraph 165). Shimazaki et al. ('176) encompass claim and would have been obvious to one of ordinary skill based on prior art.

As to Claim 7 and 18, Shimazaki et al. ('176) does not teach the ferromagnetic underlayer having a saturation magnetization range of 300 to 1000 emu/cc however, this would have been inherent as Shimazaki et al. ('176) teaches the same perpendicular layered structure as the applicants, but does not recite magnetic properties. Because of the similarities of materials and structures, the Shimazaki et al. invention would reasonably be expected to inherently have the same properties as applicants' invention.

As to Claim 8, 9,10, 18,19 Shimazaki et al. ('176) teaches that it is preferable that the film thickness of the second under layer is 5 to 20 nm. The material, which is usable for the magnetic functional layer, may be firstly composed of an alloy containing at least one noble metal selected from Pt, Pd, Rh, Au, Ag, and Cu and at least one transition metal selected from Fe, Co, and Ni. In particular, it is appropriate to use an alloy layer containing Pt or Pd and Co or Fe (Page, Paragraph 118). Shimazaki et al. ('176) teaches that it is preferable that the film thickness of the second under layer is 5 to 20 nm, which overlap applicants claim (Page, Paragraph 118). Shimazaki et al. ('176) does

Art Unit: 1773

not teach the ferromagnetic underlayer having a perpendicular anisotropy of 0.5kOe and saturation magnetization range of 300 – 1000 emu/cc however, this would have been inherent as Shimazaki et al. ('176) teaches the layered structure but does not recite magnetic properties. The physical properties of similar materials will inherently be similar. The burden of proof is shifted to the applicant to show the prior art properties are different from those claimed. See *In re Fitzgerald*, 619 F. 2d 67, 205 USPQ 594 (CCPA 1980).

As to Claim 12, Shimazaki et al. ('176) describes the recording head is a thin film magnetic head having a single magnetic pole type writing element based on the use of a soft magnetic layer having a high saturation magnetic flux density of 2.1 T. The reproducing magnetic head is a GMR (Giant Magneto-Resistive) magnetic head of the dual spin-valve type having the giant magnetoresistance effect (Paragraph 210). Claim would have been obvious to one of ordinary skill based on prior art.

As to Claim 20 and 21, Shimazaki et al. ('176) teaches it is preferable that the film thickness of the second under layer is 5 to 20 nm.(163)----Subsequently, a soft magnetic under layer was stacked on the adhesive layer. An Fe-Ta alloy was used as a material, and the film was formed to have a thickness of 200 nm. A PtCo alloy film added with oxygen was formed as the magnetic functional layer on the adhesive layer. (Paragraph 145). When the multi layer thin films are used for both of the recording layer and the magnetic functional layer, it is possible to improve, for example, the magnetic

Art Unit: 1773

flux-confining performance by continuously changing, for example, the stacking cycle and the film thickness of each of the layers by using the transition area provided between the recording layer and the magnetic functional layer. An example of the measurement of the change of the magnetic anisotropy with respect to the Co film thickness of the multi layer thin film as described. The multi layer thin film generally exhibits the perpendicular magnetic anisotropy in a region in which the Co layer is thin. Therefore, it is preferable to make the control so that the proper magnetic characteristics are obtained respectively by using the multi layer thin film in which the Co layer is not more than 0.8 nm as a fundamental material for the structure of the recording layer and using the multi layer thin film in which the Co layer is thicker than the above within a range of not less than 0.8 nm as a fundamental material for the structure of the magnetic functional layer (Paragraph 131,132). Shimazaki et al. ('176) encompass claims and would have been obvious to one of ordinary skill based on prior art.

Claim 3-6 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimazaki et al. ('176) as applied to claim 1 above, and further in view of Ohmori et al. (US Patent Application Publication US 2005/0249984).

As to Claim 3 and 14, Shimazaki et al. ('176) teaches in the present invention, the "magnetic functional layer having the coercive force in the in-plane direction" is constructed by using a pseudo-soft magnetic material. The material, which is usable for

Art Unit: 1773

the magnetic functional layer, may be firstly composed of an alloy containing at least one noble metal selected from Pt, Pd, Rh, Au, Ag, and Cu and at least one transition metal selected from Fe, Co, and Ni. In particular, it is appropriate to use an alloy layer containing Pt or Pd and Co or Fe (Page, Paragraph 119). Those preferably usable as a third material for constructing the magnetic functional layer also include, for example, a magnetic film having a microcrystalline structure obtained by uniformly dispersing, in Fe, a nitride or a carbide of at least one element selected from Ta, Nb, and Zr, for example, FeTaC. It is also allowable to use an amorphous alloy principally composed of CoZr and containing at least one element selected from Ta, Nb, and Ti. As for specified materials, it is possible to use, for example, CoNbZr and CoTaZr having high magnetic permeability (Page, Paragraph 123). Shimazaki et al. ('176) teaches all the materials described in Claim 3 with exception of Yttrium (Y). Ohmori et al ('984) teaches a magnetic recording media and the addition from among Sc, Y, Ti, Zr, Hf, Nb and Ta to enhance excellent error rate and thermal stability (Paragraph 100) or a rare earth element such as Nd, Sm, Pr, La, Ce, Dy, Gd or Tb for their use in improving strength, crystal regulation and as sintering inhibitors (Col. 5, Line 24-31). It would have been obvious to one skilled in the art to include Y taught by Ohmori et al. ('984) in the Shimazaki et al. ('176) invention in order to enhance the error rate characteristics and thermal stability.

As to Claim 4 and 15, Shimazaki et al. ('176) describes a transition area provided between layers to continuously change the stacking cycle and the film thickness of each

Art Unit: 1773

of the Co layer and the Pd layer between both layers, the stacked structure was selected so that the perpendicular magnetic anisotropy was provided at the portion corresponding to the recording layer, and the stacked structure was selected so that the in-plane magnetic anisotropy was provided at the portion corresponding to the magnetic functional layer. When the stacked structure is continuously changed between the recording layer and the magnetic functional layer, the magnetic characteristic is also continuously changed from the perpendicular magnetic anisotropy to the in-plane magnetic anisotropy. The recording head is a thin film magnetic head having a single magnetic pole type element based on the use of a soft magnetic layer having a high saturation magnetic flux density. (Page, Paragraph 210). No problem arises even when the film thickness of the soft magnetic under layer is thin. Accordingly, the excellent recording and reproduction characteristics have been successfully secured (Paragraph 224). Shimazaki et al. ('176) does not recite a Co longitudinal hard layer. However, It would have been obvious to one skilled in the art to utilize a longitudinal hard magnetic layer between the nonmagnetic substrate and soft magnetic backing layer described by Shimazaki et al. ('176) to manipulate magnetic properties, which would include applicants claim.

As to Claim 5 and 16, Shimazaki et al. ('176) teaches that it is also possible to provide an under layer which controls the crystalline orientation. For example, an alloy film mainly composed of CoCrRu can be used as the under layer (Paragraph 117). Therefore, it is preferable that the film thickness of the second under layer is 5 to 20 nm

Art Unit: 1773

(Paragraph 118). When the multi layer thin film, which resides in the same system as that of the recording layer, is used for the magnetic functional layer as described, then the effect of the seed layer stacked under the magnetic functional layer, i.e., the effect to control and properly adjust the crystalline orientation and the grain diameter is brought about for the both layers, and it is possible to realize the satisfactory state in view of the recording performance (Paragraph 134). Also with this material system, it is possible to control the exchange coupling force in the in-plane direction of the recording layer on the basis of the crystal grain structure including, for example, the size of the crystal grain. Shimazaki et al. ('176) teaches all the limitations of Claim 5 and 16 except having an average grain size of 3 nm or less. Ohmori et al. ('984) teaches an underlayer is preferably formed of microcrystals having a crystal grain size of 5nm or less or has an amorphous structure (Paragraph 86), which would encompass the claim. Combining Shimazki et al ('176) invention with Ohmori et al. ('984) would have been obvious to one skilled in the art as grain size and crystallographic orientation of the soft magnetic under layer is commonly manipulated as stated above.

As to Claim 6 and 17, Shimazaki et al. ('176) discusses that it is also possible to provide an under layer which controls the crystalline orientation. For example, an alloy film mainly composed of CoCrRu can be used as the under layer (Page, Paragraph 117). Those preferably usable as a third material for constructing the magnetic functional layer also include, for example, a magnetic film having a microcrystalline structure obtained by uniformly dispersing, in Fe, a nitride or a carbide of at least one element selected from Ta, Nb, and Zr, for example, FeTaC. It is also allowable to use

Art Unit: 1773

an amorphous alloy principally composed of CoZr and containing at least one element selected from Ta, Nb, and Ti. As for specified materials, it is possible to use, for example, CoNbZr and CoTaZr having high magnetic permeability (Paragraph 123). Shimazaki et al. ('176) does not discuss using at least one of Nb, Ta, Co, Ni, and C however he describes a Co alloy which would include Nb, Ta, Ni and C. It would have been obvious to include at least one of Ta, Nb, Co, Ni, and/or C in the underlayer to provide control of the crystalline orientation as taught by Shimazaki et al. ('176).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary D. Harris whose telephone number is 571-272-6508. The examiner can normally be reached on 8AM - 5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol D. Chaney can be reached on 571-272-1284. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1773

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GDH


CAROL CHANEY
SUPERVISORY PATENT EXAMINER

Application/Control Number: 10/791,277
Art Unit: 1773

Page 11